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Cryptosporidium and *Giardia* in different water matrices in Belgium

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Introduction

The protozoan parasites *Cryptosporidium* and *Giardia* are worldwide considered as an important cause of gastrointestinal disease. Drinking water is a potential infection source, especially when produced from surface water. Next to human wastewater, livestock is thought to contribute to surface water contamination, through effluent from stables, dung pits or manure-laden fields. Regular monitoring of the parasite load in the different water matrices in the production process is essential to obtain the baseline date for this risk-factor analysis. Therefore, the objectives of the present study were to evaluate the recovery rate of the filtering and detection procedure in different water matrices, and to monitor the occurrence of (oo)cyst in different water matrices from one facility in Belgium, producing drinking water out of surface water

Materials and Methods

A filtration and detection protocol (ISO15553) using the FiltaMax Xpress filtration (Idexx), immunomagnetic separation (Dynabeads GC Combo) and immunofluorescence (Easystain) for the detection of *Cryptosporidium* and *Giardia* in three different water matrices: raw surface water (RW), water after sedimentation and prior to treatment (SW), and purified drinking water (PW). The recovery rate was evaluated through a spiking using Colourseed. A Texas Red/FITC filter was used to differentiate spiked (oo)cysts from natural (oo)cysts.

Results

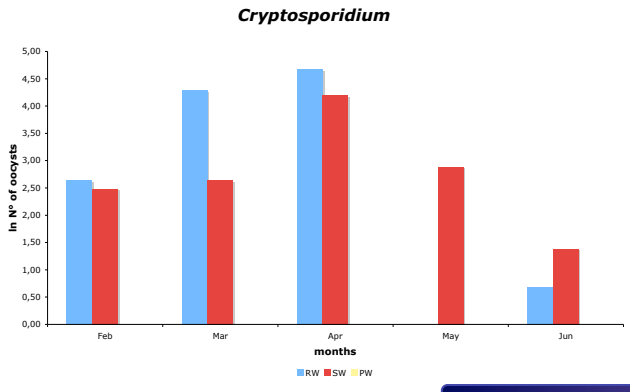
Table 1: The average recovery rates and standard deveation (in percentage) for spiked *Cryptosporidium* oocysts and *Giardia cyst* in the three different water matrices.

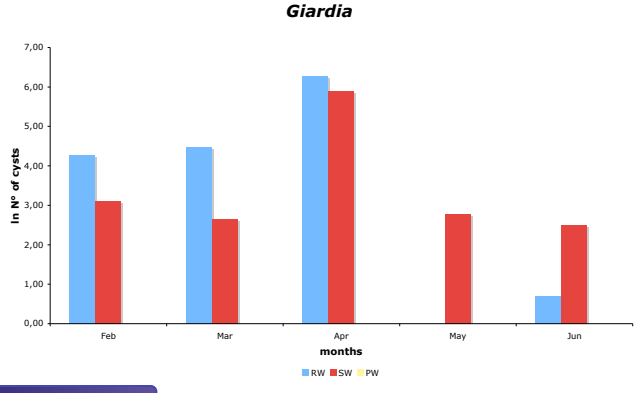
Water Matrices	*Cryptosporidium*	*Giardia*
RW	45 ± 6 %	18 ± 12 %
SW	48 ± 9 %	41 ± 8 %
PW	57 ± 11 %	64 ± 15 %

Table 2: The average number of (oo)cysts per liter for natural infections with *Cryptosporidium* and *Giardia*

Water Matrices	*Cryptosporidium*	*Giardia*
RW	5.6 ± 2.0	8.0 ± 2.0
SW	1.1 ± 0.3	1.2 ± 0.2
PW	0	0

Figure 1 : Monthly occurrence of natural infections infections with *Cryptosporidium* and *Giardia*





Conclusions

This study indicated the absence of (oo)cysts in PW in this study area, despite the high prevalence (100%) and high number of naturally occurring (oo)cysts in both RW and SW. Furthermore, large temporal variations in parasite load have been observed so far over the 5 month sampling period. Future work includes the monitoring of additional sites in both Belgium and Bangladesh, (sub)genotyping of (oo) cysts to trace the potential source of infection and the development of a GIS-based risk analysis model: epidemiological data on geological, hydrological and climate risk factors will be collected. Spatial parameters in this analysis include the presence of residential areas and associated wastewater drainage, agricultural land, presence of livestock, surface water dynamics and topography. Temporal parameters include climate, season, time of slurry spreading and calving/lambing periods.